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Sero-evidence of zoonotic viruses in rodents and humans in Kibera informal settlement, Nairobi, Kenya

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One Health relevance

Rodents are known reservoir hosts for a number of pathogens that can spillover into humans and cause disease. These threats are likely to be elevated in informal urban settlements (i.e., slums), where rodent and human densities are often high, rodents live in close proximity to humans, and human knowledge of disease risks and access to healthcare is often limited

Introduction and objective

- Rodents are reservoir hosts for a number of zoonotic pathogens and a unique feature of some rodent species is their close associations with humans
- Kibera is known to harbour large population of rodents and Information on the viruses they carry and weather they spill over to humans is lacking

- The objective of this study was to investigate zoonotic viruses associated with commensal rodents in Kibera informal urban settlement in Nairobi, Kenya

Methods

- Kibera settlement was divided into five areas on the basis of the pre-existing administrative zones to ensure geographic spread in trapping sites (Figure 1).
- A total of 300 trap nights were conducted across the five focus areas for 10 days (Feb3-13, 2019)

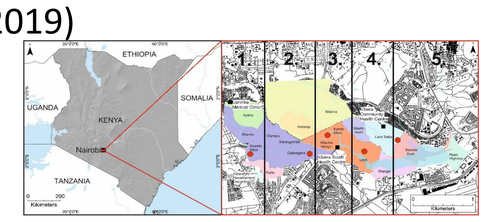

Figure 1: Map of Kenya with the Kibera settlement and its pre-existing administrative boundaries (1 – 5)

- Human serum samples were collected from febrile patients seeking medical care in 3 health facilities in Kibera (Feb-Jun 2017)
- Samples screened for antibodies against orthopoxviruses arenaviruses and hantaviruses using IFA

Results

Host species	Orthopoxvirus	Arenavirus	Hantavirus
Mus musculus	3/149 (2.0%)	0/149	0/149
Rattus rattus	5/46 (10.9%)	0/46	0/46
Total	8/195 (4.1%)	0/195	0/195

The proportion of seropositive rodent samples for orthopoxviruses across the different trapping sites

Trapping sites	Trapping zone	Other sites	Rattus rattus	Mus musculus	Total
Soweto West	1		1/24 (4.2%)	0/13(0.0%)	1/37(2.7%)
Gatwekere	2		0/3(0.0%)	0/29(0.0%)	0/32(0.0%)
Kisumu Ndogo	3		0/1(0.0%)	0/36(0.0%)	0/37(0.0%)
Lindi	4	Communal dump site	3/8 (37.5%)	0/1(0.0%)	3/9(33.3%)
		Households	1/8 (12.5%)	1/31(3.2%)	2/39(5.1%)
Soweto East	5		0/2(0.0%)	2/39(5.1%)	2/41(4.9%)

Seroprevalence of rodent-borne zoonoses in patients attending health care facilities in Kibera

			Hantavirus	
Health care facility	Orthopoxvirus	Arenavirus	DOBV	PUUV
Kibera Community Health Centre	3/53 (5.7%)	1/53 (1.9%)	0/53 (0.0%)	4/53 (7.5%)
Ushirika Medical Clinic	3/51 (5.9%)	1/51 (2.0%)	3/51 (5.9%)	2/51 (3.9%)
Kibera south Health Centre	0/20 (0.0%)	2/20 (10.0%)	1/20 (5.0%)	0/20 (0.0%)
Total	6/124 (4.8%)	4/124 (3.2%)	4/124 (3.2%)	6/124 (4.8%)

Discussion and conclusion

- We detected antibodies against hantaviruses and arenaviruses in humans but not in rodents
- The overall seroprevalence for orthopoxviruses in captured rodents and human patients was similar
- There was clear difference in prevalence among sites (zone 4)
- Both zones (4,5) which had high seroprevalence in rodents also recorded high seroprevalence among patients in the facility
- Our trapping focused on urban settings where *M. musculus and R. rattus* dominate
- Other species which carry these viruses may be present or residents were exposed elsewhere.
- This study provides strong evidence for infection by orthopoxviruses, arenaviruses and hantaviruses in humans and commensal rodents
- It highlights the risks rodent viruses pose to humans in urban slum settlements in LMIC

Ogola et al. 2021. Sero-evidence of zoonotic viruses in rodents and humans in Kibera informal settlement, Nairobi, Kenya. *Vector Borne and Zoonotic Diseases* (in press)